Pre-equilibrium cluster emission with pickup and knockout

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We present a generalization of the Iwamoto-Harada-Bisplinghoff pre-equilibrium model of light cluster formation and emission in the course of nuclear reaction, which is enhanced by allowing for possible admixtures of knockout for strongly coupled ejectiles, like α's.

The model is able to attain the Weisskopf-Ewing formula for the compound nucleus decay at long-time limit; it keeps the philosophy of pre-equilibrium decay during the equilibration stage and describes the initial phase of a reaction as direct process(es) expressed using the language of the exciton model.

The idea is applied to several proton-induced reactions at energies between 20 and 100 MeV, to demonstrate its possibilities.

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